EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	5	(server-heavy or (server with (heavy or fat)) or client-heavy or (client with (heavy or fat))) and (transaction)	EPO; DERWENT	OR	ON	2007/04/29 19:35
L2	352	transaction with (batch$3 or aggregat$4)	EPO; DERWENT	OR	ON	2007/04/29 19:35
L3	80	(transaction with (batch$3 or aggregat$4)) and (client or server)	EPO; DERWENT	OR	ON	2007/04/29 19:36
S1	2	"7107230".pn.	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2006/11/14 09:17
S2	1	"6070149".pn. and (portable adj code)	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2006/10/30 16:09
S3	0	tabor.in. and (portable adj code)	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2006/11/14 09:17
S4	1	tavor.in. and (portable adj code)	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2006/11/14 11:08
S5	54	("4992940" | "5454106" | "5581664" | "5586218" | "5696962" | "5701399" | "5715399" | "5774868" | "5852814" | "5890139" | "5905973" | "5926798" | "5937389" | "5978784" | "5983200" | "6012051").PN. OR ("6070149").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2006/11/14 09:18
S6	1	(S3 or S4) and (client-side or server-side or ((client or server) adj (heavy or side or centric)) or client-heavy or server-heavy or client-centric or server-centric)	US-PGPUB; USPAT; USOCR	OR	ON	2006/11/14 09:20
S7	2	tavor.in. and (session)	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2006/11/14 11:08

Note: titles, abstracts, kwics & full text reviewed as necessary - RPond 4/29/07

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S8	54	("4992940" | "5454106" | "5581664" | "5586218" | "5696962" | "5701399" | "5715399" | "5774868" | "5852814" | "5890139" | "5905973" | "5926798" | "5937389" | "5978784" | "5983200" | "6012051").PN. OR ("6070149").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/08 17:17
S9	2	tavor.in. and (session)	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2007/01/08 17:17
S10	56	S8 or S9	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/08 17:18
S11	1	S10 and ((bulk adj transaction) or (portable adj code) or client-in-charge or server-in-charge or ((client or server) adj2 charge))	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/08 17:19
S12	40	S10 and ((bulk adj transaction) or tavor$2 or (portable adj code) or client-in-charge or server-in-charge or ((client or server) adj2 charge))	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/08 17:22
S13	50	(accelerat$3 with (transmi$5 or communicat$3) with (session or transact$3)) and (client-server or client?server or (client near2 server))	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/08 17:32
S14	1	"7120666".pn. and ((accelerat$4 with (session or transact$3)) same (client-server or client?server or (client near2 server)))	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/08 17:33
S15	47	((accelerat$4 with (session or transact$3)) same (client-server or client?server or (client near2 server)))	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/08 17:45
S16	5	("7120666".pn. or "6070149".pn. or "7007163".pn. "20010037400".pn. "20030014623".pn.) and ((accelerat$4 with (session or transact$3)) same (client-server or client?server or (client near2 server)))	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/08 17:45
S17	47	((accelerat$4 with (session or transact$4)) same (client-server or client?server or (client near2 server)))	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/08 17:45
S18	5	("7120666".pn. or "6070149".pn. or "7007163".pn. "20010037400".pn. "20030014623".pn.) and ((accelerat$4 with (session or transact$4)) same (client-server or client?server or (client near2 server)))	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/08 18:40

EAST Search History

S19	138	(accelerat$4 or reduc$3) with (client-server or client?server or (client near2 server)) with (session or transact$4)	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/08 17:56
S20	1	("5931913".pn.) and ((accelerat$4 or reduc$3) with (client-server or client?server or (client near2 server)) with (session or transact$4))	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/08 17:49
S21	826	reduc$4 with transfer$4 with (client-server or client?server or (client near3 server) or session or transact$4)	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/08 17:52
S22	255	reduc$4 near5 transfer$4 near5 (client-server or client?server or (client near3 server) or session or transact$4)	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/08 17:53
S23	48	reduc$4 near5 (number or frequenc$3) near5 transfer$4 near5 (client-server or client?server or (client near3 server) or session or transact$4)	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/08 17:54
S24	145	(accelerat$4 or reduc$4) with (client-server or client?server or (client near2 server)) with (session or transact$4) and (reduc$4 or minimiz$3 or faster or speed$3 or accelerat$4)	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/08 18:00
S25	88	(accelerat$4 or reduc$4) with (client-server or client?server or (client near2 server)) with (session or transact$4) and (reduc$4 or minimiz$3 or faster or speed$3 or accelerat$4) and (web or web-based)	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/08 18:00
S26	94	(accelerat$4 or reduc$4) with (client-server or client?server or (client near2 server)) with (session or transact$4) and (reduc$4 or minimiz$3 or faster or speed$3 or accelerat$4) and (web or web-based or browser or html or ((markup or mark-up) adj language))	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/08 18:04
S27	423	((accelerat$4 or reduc$4) with ((round adj trip) or transaction or interaction or session)) same (client-server or client?server or (client near2 server))	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/08 18:07
S28	382	((reduc$4) with ((round adj trip) or transaction or interaction or session)) same (client-server or client?server or (client near2 server))	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/08 18:07
S29	38	((reduc$4) with ((round adj trip) or transaction or interaction or session)) same (client-server or client?server or (client near2 server)) and (accelerat$4)	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/08 18:17

EAST Search History

S30	5	("20050010454".pn. "5931913".pn. "7120666".pn. "20010037400".pn. "20040215746".pn.) and (((reduc$4) with ((round adj trip) or transaction or interaction or session)) same (client-server or client?server or (client near2 server)) and (accelerat$4))	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/08 18:22
S31	859	((reduc$4 or minimiz$7 or lower$3) with ((round adj trip) or request$3)) same (client-server or client?server or (client near2 server))	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/08 18:24
S32	436	((reduc$4 or minimiz$7 or lower$3) with ((round adj trip) or request$3)) with (client-server or client?server or (client near2 server) or (terminal near3 (host or main or server)))	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/08 18:25
S33	190	((reduc$4 or minimiz$7 or lower$3) near5 ((round adj trip) or request$3)) with (client-server or client?server or (client near2 server) or (terminal near3 (host or main or server)))	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/08 18:25
S34	172	((reduc$4 or minimiz$7 or lower$3) near5 ((round adj trip) or request$3)) with (client-server or client?server or (client near2 server))	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/08 18:28
S35	3	("6321274".pn. "6385636".pn. "6542911".pn.) and ((reduc$4 or minimiz$7 or lower$3) near5 ((round adj trip) or request$3)) with (client-server or client?server or (client near2 server))	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/08 18:39
S36	2	"6070149".pn. or "6725257".pn.	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/19 15:36
S37	7530	(server-side or (server adj side)) and (client-side or (client adj side))	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/19 15:33
S38	574	(server-side or (server adj side)) and (client-side or (client adj side)) and ((minim$5 or reduc$5 or efficien$5) with (transact$4))	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/19 15:35
S39	349	(server-side or (server adj side)) and (client-side or (client adj side)) and ((minim$5 or reduc$5 or efficien$5) near5 (transact$4))	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/19 15:35
S40	0	S36 and S39	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/19 15:35

EAST Search History

S41	2	("6070149".pn. or "6725257".pn.) and (server-side or (server adj side)) and (client-side or (client adj side))	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/19 15:36
S42	2	("6070149".pn. or "6725257".pn.) and (server-side or (server adj side)) and (client-side or (client adj side)) and (transact$5)	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/19 15:37
S43	2	("6070149".pn. or "6725257".pn.) and (server-side or (server adj side)) and (client-side or (client adj side)) and (transact$5) and ((minim$5 or reduc$5 or efficien$5) same (transact$4))	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/19 15:38
S44	1088	(server-side or (server adj side)) and (client-side or (client adj side)) and (transact$5) and ((minim$5 or reduc$5 or efficien$5) same (transact$4))	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/19 15:38
S45	971	(server-side or (server adj side)) and (client-side or (client adj side)) and (transact$5) and ((minim$5 or reduc$5 or efficien$5) same (transact$4)) and (brows$3 or web or website or web-site or webserver or web-server or (web adj (site or server or browser)))	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/19 17:27
S46	977	(server-side or server-heavy or (server adj (heavy or side))) and (client-side or client-heavy (client adj (heavy or side))) and (transact$5) and ((minim$5 or reduc$5 or efficien$5) same (transact$4)) and (brows$3 or web or website or web-site or webserver or web-server or (web adj (site or server or browser)))	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/19 17:51
S47	6	S46 not S45	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/19 17:28
S48	158	S46 and ((build$3 or bulk or accumulat$4) with transaction)	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/19 17:43

EAST Search History

S49	684	(((fat adj server) or server-side or server-heavy or (server adj (heavy or side))) same ((fat adj client) or client-side or client-heavy (client adj (heavy or side)))) and (transact$5 or session) and ((minim$5 or reduc$5 or efficien$5) same (transact$4)) and (brows$3 or web or website or web-site or webserver or web-server or (web adj (site or server or browser)))	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/19 17:53
S50	685	((((fat adj server) or server-side or server-heavy or (server adj (heavy or side))) same ((fat adj client) or client-side or client-heavy (client adj (heavy or side)))) same (transact$5 or session))	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/19 17:56
S51	330	"5754774".pn. ((((fat adj server) or server-side or server-heavy or (server adj (heavy or side))) same ((fat adj client) or client-side or client-heavy (client adj (heavy or side)))) same transact$5)	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/19 18:00
S52	329	((((fat adj server) or server-side or server-heavy or (server adj (heavy or side))) same ((fat adj client) or client-side or client-heavy (client adj (heavy or side)))) same transact$5)	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/25 09:37
S53	2	("5956709".pn. "6101482".pn.) and ((((fat adj server) or server-side or server-heavy or (server adj (heavy or side))) same ((fat adj client) or client-side or client-heavy (client adj (heavy or side)))) same transact$5)	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/19 18:12
S54	1	"7120666".pn.	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/19 18:12
S55	520	(server-heavy or (server with (heavy or fat))) and (client-heavy or (client with (heavy or fat)))	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/25 09:43
S56	42	"705"$.ccls. and (server-heavy or (server with (heavy or fat))) and (client-heavy or (client with (heavy or fat)))	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/25 09:45
S57	2	("20030144964".pn. "20010016871". pn.) and ("705"$.ccls.) and (server-heavy or (server with (heavy or fat))) and (client-heavy or (client with (heavy or fat)))	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/25 09:48

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S58	25	("705"$.ccls.) and (server-heavy or (server with (heavy or fat))) and (client-heavy or (client with (heavy or fat))) and (transact$3 or transaction-specific)	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/25 10:20
S59	93	((server-heavy or (server with (heavy or fat))) or (client-heavy or (client with (heavy or fat)))) and ((batch or aggregat$5) with transact$3)	US-PGPUB; USPAT; USOCR	OR	ON	2007/04/29 01:01
S60	1	"6332163".pn. and ((server-heavy or (server with (heavy or fat))) or (client-heavy or (client with (heavy or fat)))) and ((batch$3 or aggregat$5) with transact$3)	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/25 10:29
S61	93	((server-heavy or (server with (heavy or fat))) or (client-heavy or (client with (heavy or fat)))) and ((batch$3 or aggregat$5) with transact$3)	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/25 10:29
S62	109	((server-heavy or (server with (heavy or fat))) or (client-heavy or (client with (heavy or fat)))) and ((batch$3 or aggregat$5 or accumulat$4) with transact$3)	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/25 15:54
S63	141	((server-heavy or (server with (heavy or fat))) or (client-heavy or (client with (heavy or fat)))) and ((batch$3 or aggregat$5 or accumulat$4) with (instance or transact$3))	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/25 10:31
S64	116	((server-heavy or (server with (heavy or fat))) or (client-heavy or (client with (heavy or fat)))) and ((batch$3 or aggregat$5 or accumulat$4) with (instance or transact$3)) and (overhead or throughput or through-put or bandwidth or thru-put or capacit$3 or latenc$3)	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/25 10:33
S65	125	((server-heavy or (server with (heavy or fat))) or (client-heavy or (client with (heavy or fat)))) and ((batch$3 or aggregat$5 or accumulat$4) with (instance or transact$3)) and (effic$6 or overhead or throughput or through-put or bandwidth or thru-put or capacit$3 or latenc$3)	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/25 10:33

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S66	127	((server-heavy or (server with (heavy or fat))) or (client-heavy or (client with (heavy or fat)))) and ((batch$3 or aggregat$5 or accumulat$4) with (instance or transact$3)) and (reduc$5 or effic$6 or overhead or throughput or through-put or bandwidth or thru-put or capacit$3 or latenc$3)	US-PGPUB; USPAT; USOCR	OR	ON	2007/03/27 14:14
S67	1	("6332163".pn.) and ((server-heavy or (server with (heavy or fat))) or (client-heavy or (client with (heavy or fat)))) and ((batch$3 or aggregat$5 or accumulat$4) with (instance or transact$3)) and (reduc$5 or effic$7 or overhead or throughput or through-put or bandwidth or thru-put or capacit$3 or latenc$3 or minimiz$6)	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/25 11:16
S68	1	("6332163".pn.) and ((lazy or deferred) with load$3)	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/25 11:18
S69	1	("6332163".pn.) and (((lazy or deferred) with load$3) or batch$3)	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/25 11:20
S70	1	("6332163".pn.) and (request$3 with batch$3)	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/25 15:52
S71	1	("6332163".pn.) and (shop$4 or buy$3 or purchas$3 or commerce or e-commerce or v-commerce)	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/25 14:36
S72	1	("6332163".pn.) and (simplified adj application adj development)	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/25 12:22
S73	1	("6332163".pn.) and (technology adj generation)	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/25 12:22
S74	5	"20020120529".pn. "20040254843". pn. "6,779,041".pn. "20050188051". pn. "20040003345".pn.	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/25 14:40
S75	1	"20040267627".pn.	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/25 14:41
S76	1	"20040267627".pn. and ((first or second) adj server)	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/25 14:41
S77	0	2002/0143662.pn.	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/25 15:53

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S78	1	"20020143662".pn.	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/25 15:53
S79	0	S78 and ((server-heavy or (server with (heavy or fat))) or (client-heavy or (client with (heavy or fat))))	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/25 15:55
S80	0	S78 and (batch$3 or aggregat$3 or accumulat$4)	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/25 15:55
S81	0	S78 and (batch$3 or hold$3 or held or aggregat$3 or accumulat$4)	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/25 15:55
S82	0	S78 and (batch$3 or build$3 or hold$3 or held or aggregat$3 or accumulat$4)	US-PGPUB; USPAT; USOCR	OR	ON	2007/01/25 15:55
S83	48175	product adj process	US-PGPUB; USPAT; USOCR	OR	ON	2007/03/27 14:15
S84	0	((server-heavy or (server with (heavy or fat))) or (client-heavy or (client with (heavy or fat)))) and ((batch or aggregat$5) with transact$3)	FPRS; EPO; JPO; DERWENT	OR	ON	2007/04/29 01:02
S85	0	((server-heavy or (server with (heavy or fat))) or (client-heavy or (client with (heavy or fat)))) and ((batch$3 or aggregat$5 or accumulat$4) with transact$3)	FPRS; EPO; JPO; DERWENT	OR	ON	2007/04/29 01:03
S86	3	(client adj server) and (server-heavy or (server with (heavy or fat)) or client-heavy or (client with (heavy or fat))) and ((reduc$5 or minimiz$6 or minimal$2) with (traffic or load$3))	FPRS; EPO; JPO; DERWENT	OR	ON	2007/04/29 01:06
S87	3	(client adj server) and (server-heavy or (server with (heavy or fat)) or client-heavy or (client with (heavy or fat))) and ((reduc$5 or minimiz$6 or minimal$2) with (workload or traffic or load$3))	FPRS; EPO; JPO; DERWENT	OR	ON	2007/04/29 01:08
S88	15	(server-heavy or (server with (heavy or fat)) or client-heavy or (client with (heavy or fat))) and ((reduc$5 or minimiz$6 or minimal$2) with (workload or traffic or load$3))	FPRS; EPO; JPO; DERWENT	OR	ON	2007/04/29 01:10
S89	0	(server-heavy or (server with (heavy or fat)) or client-heavy or (client with (heavy or fat))) and (increas$3 with respons$3)	FPRS; EPO; JPO; DERWENT	OR	ON	2007/04/29 01:11

EAST Search History

S90	172	(server-heavy or (server with (heavy or fat)) or client-heavy or (client with (heavy or fat)))	FPRS; EPO; JPO; DERWENT	OR	ON	2007/04/29 01:12
S91	6	(server-heavy or (server with (heavy or fat)) or client-heavy or (client with (heavy or fat))) and (transaction)	FPRS; EPO; JPO; DERWENT	OR	ON	2007/04/29 19:34
S92	748	accenture.as.	FPRS; EPO; JPO; DERWENT	OR	ON	2007/04/29 01:17
S93	3	accenture.as. and ((transaction adj process$3) or (request adj batch$3))	FPRS; EPO; JPO; DERWENT	OR	ON	2007/04/29 01:33
S94	49	(request adj batch$3)	FPRS; EPO; JPO; DERWENT	OR	ON	2007/04/29 01:19
S95	89	accenture.as. and ((transaction adj process$3) or (request adj batch$3))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2007/04/29 01:41
S96	52	accenture.as. and ((transaction or request) near5 batch$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2007/04/29 01:43
S97	16	"9908208".pn. "9201251".pn. "9944155".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2007/04/29 01:47
S98	2	tavor.in. and (session)	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2007/04/29 19:06
S99	6	"968480".pn. "9843146".pn. "9847059".pn.	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2007/04/29 19:07

Item 4 #9/17

Logon

*** It is now 4/29/07 7:51:35 PM ***

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[File 15] **ABI/Inform(R)** 1971-2007/Apr 28

[File 9] **Business & Industry(R)** Jul/1994-2007/Apr 27

[File 610] **Business Wire** 1999-2007/Apr 27

**File 610: File 610 now contains data from 3/99 forward. Archive data (1986-2/99) is available in File 810.*

[File 810] **Business Wire** 1986-1999/Feb 28

[File 275] **Gale Group Computer DB(TM)** 1983-2007/Apr 27

[File 476] **Financial Times Fulltext** 1982-2007/Apr 29

[File 624] **McGraw-Hill Publications** 1985-2007/Apr 25

**File 624: Homeland Security & Defense and 9 Platt energy journals added Please see HELP NEWS624 for more*

[File 621] **Gale Group New Prod.Annou.(R)** 1985-2007/Apr 26

[File 636] **Gale Group Newsletter DB(TM)** 1987-2007/Apr 26

[File 613] **PR Newswire** 1999-2007/Apr 27

**File 613: File 613 now contains data from 5/99 forward. Archive data (1987-4/99) is available in File 813.*

[File 813] **PR Newswire** 1987-1999/Apr 30

[File 16] **Gale Group PROMT(R)** 1990-2007/Apr 27

[File 160] **Gale Group PROMT(R)** 1972-1989

[File 634] **San Jose Mercury** Jun 1985-2007/Apr 22

[File 148] **Gale Group Trade & Industry DB** 1976-2007/Apr 27

[File 20] **Dialog Global Reporter** 1997-2007/Apr 29

[File 35] **Dissertation Abs Online** 1861-2007/Apr

[File 583] **Gale Group Globalbase(TM)** 1986-2002/Dec 13

**File 583: This file is no longer updating as of 12-13-2002.*

[File 65] **Inside Conferences** 1993-2007/Apr 27

[File 2] **INSPEC** 1898-2007/Apr W3

[File 474] **New York Times Abs** 1969-2007/Apr 29

[File 475] **Wall Street Journal Abs** 1973-2007/Apr 27

[File 99] **Wilson Appl. Sci & Tech Abs** 1983-2007/Mar

[File 256] **TecInfoSource** 82-2007/Apr

[File 348] **EUROPEAN PATENTS** 1978-2007/ 200716

**File 348: For important information about IPCR/8 and forthcoming changes to the IC= index, see HELP NEWSIPCR.*

[File 349] **PCT FULLTEXT** 1979-2007/UB=20070419UT=20070312

**File 349: For important information about IPCR/8 and forthcoming changes to the IC= index, see HELP NEWSIPCR.*

[File 347] **JAPIO** Dec 1976-2006/Dec(Updated 070403)

[File 635] **Business Dateline(R)** 1985-2007/Apr 28

[File 570] **Gale Group MARS(R)** 1984-2007/Apr 27

[File 387] **The Denver Post** 1994-2007/Apr 26

[File 471] **New York Times Fulltext** 1980-2007/Apr 28

[File 492] **Arizona Repub/Phoenix Gaz** 19862002/Jan 06

**File 492: This file is no longer updating.*

[File 494] **St LouisPost-Dispatch** 1988-2007/Apr 25

[File 631] **Boston Globe** 1980-2007/Apr 27

[File 633] **Phil.Inquirer** 1983-2007/Apr 27

[File 638] **Newsday/New York Newsday** 1987-2007/Apr 27

[File 640] **San Francisco Chronicle** 1988-2007/Apr 29

[File 641] **Rocky Mountain News** Jun 1989-2007/Apr 28

[File 702] **Miami Herald** 1983-2007/Mar 25

[File 703] **USA Today** 1989-2007/Apr 27

[File 704] **(Portland)The Oregonian** 1989-2007/Apr 27

[File 713] **Atlanta J/Const.** 1989-2007/Apr 29

[File 714] **(Baltimore) The Sun** 1990-2007/Apr 27

[File 715] **Christian Sci.Mon.** 1989-2007/Apr 30

[File 725] **(Cleveland)Plain Dealer** Aug 1991-2007/Apr 28

[File 735] **St. Petersburg Times** 1989- 2007/Apr 28

[File 477] **Irish Times** 1999-2007/Apr 27

[File 710] **Times/Sun.Times(London)** Jun 1988-2007/Apr 28

[File 711] **Independent(London)** Sep 1988-2006/Dec 12

**File 711: Use File 757 for full current day's news of the Independent, as as well as full coverage of many additional European news sources.*

[File 756] **Daily/Sunday Telegraph** 2000-2007/Apr 27

[File 757] **Mirror Publications/Independent Newspapers** 2000-2007/Apr 27

[File 47] **Gale Group Magazine DB(TM)** 1959-2007/Apr 16


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       163193   AGGREGATES

       131615   AGGREGATED

        94738   AGGREGATING

       221225   AGGREGATION

         9184   AGGREGATIONS

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      1007066   AGGREGATE

       163193   AGGREGATES

       131615   AGGREGATED

        94738   AGGREGATING

       221225   AGGREGATION

         9184   AGGREGATIONS

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>>>W: One or more prefixes are unsupported
  or undefined in one or more files.
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S1      35158   S (TRANSACTION OR TRANSACTIONS)(10N)(AGGREGATE OR AGGREGATES OR
AGGREGATED OR AGGREGATING OR AGGREGATION OR AGGREGATIONS)

S2      23576   S (TRANSACTION OR TRANSACTIONS)(5N)(AGGREGATE OR AGGREGATES OR AGGREGATED
OR AGGREGATING OR AGGREGATION OR AGGREGATIONS)

S3  111461495   S PD<20030627


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Processing

       23576   S2

    111461495   S3

S4      15188   S S2 AND S3


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      4001927   TRAFFIC

       433375   CONGESTION

       130596   CONGESTED

S5    4252698   S (TRAFFIC OR CONGESTION OR CONGESTED)


? s s4 and s5

        15188   S4

      4252698   S5

S6        592   S S4 AND S5


? s (network or client or server)(5n)(traffic or congestion or congested)

Processing

Processing

Processing

     12447122   NETWORK

      3661841   CLIENT

      2395796   SERVER
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      4001927   TRAFFIC
       433375   CONGESTION
       130596   CONGESTED

S7     272840   S (NETWORK OR CLIENT OR SERVER)(5N)(TRAFFIC OR CONGESTION OR CONGESTED)

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        15188   S4
       272840   S7
S8        119   S S4 AND S7

?  rd
>>>W:  Duplicate detection is not supported for File 348.
Duplicate detection is not supported for File 349.
Duplicate detection is not supported for File 347.
Records from unsupported files will be retained in the RD set.
S9         81   RD  (UNIQUE ITEMS)

?  t s9/free/all
>>>W:  "FREE" is not a valid format name in file(s): 347-349
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9/8/1 (Item 1 from file: 15)
ABI/Inform(R)

02723604 535189441

****USE FORMAT 7 OR 9 FOR FULL TEXT****

Regulation by Networks
Word Count: 14563
2003
Geographic Names: United States; US

Descriptors: Regulation; Economies of scale; Private enterprise
Classification Codes: 9190 (CN=United States); 4310 (CN=Regulation)
Print Media ID: 18523

9/8/2 (Item 2 from file: 15)
ABI/Inform(R)

02164227 69930442

****USE FORMAT 7 OR 9 FOR FULL TEXT****
A 3G billing maze
Word Count: 2397 **Length:** 3 Pages
Mar 2001

Descriptors: Carriers; Problems; Flexibility; Billings; Accuracy; Communications networks
Classification Codes: 8330 (CN=Broadcasting & telecommunications); 5250 (CN=Telecommunications systems & Internet communications)
Print Media ID: 17540

9/8/3 (Item 3 from file: 15)
ABI/Inform(R)

01134044 97-83438
****USE FORMAT 7 OR 9 FOR FULL TEXT****
Progress report on modeling distributed environments
Word Count: 3468 **Length:** 13 Pages
Oct 1995

Descriptors: Distributed processing ; Client server computing; Open systems; Standards
Classification Codes: 5240 (CN=Software & systems)

9/8/4 (Item 4 from file: 15)
ABI/Inform(R)

00952969 96-02362
****USE FORMAT 7 OR 9 FOR FULL TEXT****
Bandwidth isn't free
Word Count: 1269 **Length:** 2 Pages
Dec 1994

Descriptors: Bandwidths; Communications networks; Data transmission; Technological change
Classification Codes: 5250 (CN=Telecommunications systems)

9/8/5 (Item 1 from file: 9)
Business & Industry(R)

02154525 Supplier Number: 25694527 **(USE FORMAT 7 OR 9 FOR FULLTEXT)**
Inktomi Forges a Slew of Partnerships

May 08, 2000
Word Count: 307
Company Names: ESCALATE INC; INKTOMI CORP; VCOMMERCE
Industry Names: Network hardware and software; Software

Product Names: Computer programming, data processing, and other computer related services (737000); Communications software packages, except networking (737251)
Concept Terms: All company; E-Commerce; Joint venture
Geographic Names: North America (NOAX); United States (USA)

9/8/6 (Item 1 from file: 610)
Business Wire

00897516 20030507127B2556 **(USE FORMAT 7 FOR FULLTEXT)**
Concurrent Introduces Intelligent Asset Management Solution in Support of Rapidly Evolving Requirements for Everything-On-Demand TV

Wednesday , May 7, 2003 13:27 EDT
Word Count: 1,175
Company Names: concurrent computer corp.; INTELLIGENT ASSET MANAGEMENT; SECURITIES AND EXCHANGE COMMISSION
Product Names: ADVERTISING AND PROMOTION; COMMUNICATIONS TECHNOLOGIES; COMPUTER SOFTWARE; COMPUTERS; CORPORATE; DATA COMMUNICATIONS; INSTITUTIONS; LEGAL; MARKETING; MEASUREMENT AND TESTING; NETWORKS; PATENTS AND TRADEMARKS; REGULATION
Event Names: ADVERTISING AND PROMOTION; CONTRACTS AND ORDERS; CORPORATE FINANCIAL DATA; ENVIRONMENT; FINANCIAL AND COMMODITY MARKETS; INTERNATIONAL ISSUES; INVESTMENT; LEGAL; MARKET DATA; NEW PRODUCT DEVELOPMENT; PATENTS AND TRADEMARKS; REGULATION; RESEARCH AND DEVELOPMENT; STOCKS AND SHARES; TECHNOLOGY DEVELOPMENT

9/8/7 (Item 2 from file: 610)
Business Wire

00702164 20020424114B9963 **(USE FORMAT 7 FOR FULLTEXT)**
iBasis Reports Record Traffic Volume and Revenue For First Quarter 2002

Wednesday , April 24, 2002 07:30 EDT
Word Count: 2,033
Company Names: ibasis, inc.; CABLE AND WIRELESS PLC; AT AND T CORP; H AND R BLOCK INC; HOME SHOPPING NETWORK INC; WORLDCOM INC
Product Names: COMMUNICATIONS TECHNOLOGIES; COMPANY PROFILES; CORPORATE; CORPORATE FINANCIAL DATA; FINANCIAL SERVICES; INVESTMENT; MERGERS AND ACQUISITIONS; STOCKS AND SHARES; TELECOMMUNICATIONS
Event Names: CORPORATE FINANCIAL DATA; CORPORATE FUNDING; CORPORATE GROUPS AND OWNERSHIP ; CORPORATE PERFORMANCE; FINANCIAL AND COMMODITY MARKETS; MERGERS AND ACQUISITIONS; REGULATION; RESEARCH AND DEVELOPMENT; STOCKS AND SHARES

9/8/8 (Item 3 from file: 610)

Business Wire

00690723 20020404094B0031 **(USE FORMAT 7 FOR FULLTEXT)**
Infonet's Network Analysis Program Identifies Exponential Transactions Generated Via ERP, SCM and CRM Enterprise Class Applications-Knowledge of This Effect Enables Companies to Optimize Application Performance and Return on Investment (ROI)

Thursday , April 4, 2002 08:01 EDT
Word Count: 899
Company Names: infonet services corporation; US SECURITIES INTERNATIONAL CORP; US SECURITIES CORP; TECHNICAL
Geographic Names: AMERICAS; CALIFORNIA; NORTH AMERICA; USA
Product Names: COMMUNICATIONS TECHNOLOGIES; COMPUTER SOFTWARE; COMPUTERS; CORPORATE; CORPORATE NETWORKS; DATA COMMUNICATIONS; INTERNET; NETWORKS; STRATEGY AND PLANNING
Event Names: CORPORATE PERFORMANCE; FINANCIAL AND COMMODITY MARKETS; MAJOR CORPORATIONS; MANAGEMENT PROCEDURES; STOCKS AND SHARES; STRATEGY AND PLANNING; TECHNOLOGY DEVELOPMENT

9/8/9 (Item 4 from file: 610)
Business Wire

00664920 20020214045B7348 **(USE FORMAT 7 FOR FULLTEXT)**
iBasis Posts Record Traffic Volume and Revenue For Fourth Quarter and Full Year 2001

Thursday , February 14, 2002 08:12 EST
Word Count: 2,522
Company Names: ibasis, inc.
Geographic Names: AMERICAS; NORTH AMERICA; USA
Product Names: COMMUNICATIONS TECHNOLOGIES; COMPANY PROFILES; COMPUTERS; CORPORATE; CORPORATE FINANCIAL DATA; DATA COMMUNICATIONS; INTERNET; NETWORKS; TELECOMMUNICATIONS
Event Names: CORPORATE FINANCIAL DATA; CORPORATE GROUPS AND OWNERSHIP; FINANCIAL AND COMMODITY MARKETS; FORECASTS; MERGERS AND ACQUISITIONS; STOCKS AND SHARES

9/8/10 (Item 5 from file: 610)
Business Wire

00632699 20011207341B5767 **(USE FORMAT 7 FOR FULLTEXT)**
NetRatings' Pending Acquisition of Jupiter Media Metrix Subject to Request for Additional Information Under U.S. Antitrust Laws

Friday , December 7, 2001 18:52 EST
Word Count: 1,662
Company Names: media metrix, inc.; netratings inc; FEDERAL TRADE COMMISSION; SECURITIES AND

EXCHANGE COMMISSION; AC NIELSEN CORP; NIELSEN MEDIA RESEARCH; STAPLETON COMMUNICATIONS
Geographic Names: AMERICAS; CALIFORNIA; NORTH AMERICA; USA
Product Names: ADVERTISING AND PROMOTION; COMMUNICATIONS TECHNOLOGIES; COMPANY PROFILES; CORPORATE; CORPORATE FINANCIAL DATA; ELECTRONIC COMMERCE; FINANCIAL SERVICES; INSTITUTIONS; INTERNET; INVESTMENT; MARKET RESEARCH; MARKETING; MERGERS AND ACQUISITIONS; MONOPOLIES; REGULATION; STOCKS AND SHARES
Event Names: ADVERTISING AND PROMOTION; CORPORATE FINANCIAL DATA; FORECASTS; MARKET RESEARCH; MERGERS AND ACQUISITIONS; MONOPOLIES; PRODUCTIVITY; REGULATION; STOCKS AND SHARES; TECHNOLOGY DEVELOPMENT

9/8/11 (Item 6 from file: 610)
Business Wire

00270012 20000502123B0485 **(USE FORMAT 7 FOR FULLTEXT)**
Inktomi Forges Alliances with Escalate and Vcommerce Corporation To Streamline Retail Supply Chain

Tuesday , May 2, 2000 09:16 EDT
Word Count: 1,106
Company Names: media metrix, inc.; mattel, inc.; yahoo! inc.; sun microsystems, inc.; realnetworks, inc.; british telecommunications, plc; america online, inc.; inktomi corp.; AMERICA ONLINE INC; BRITISH TELECOMMUNICATIONS PLC; YAHOO INC; SUN MICROSYSTEMS INC; BARKSDALE GROUP; MATTEL INC
Geographic Names: CALIFORNIA; AMERICAS; NORTH AMERICA; USA
Product Names: COMPUTER SOFTWARE; CORPORATE NETWORKS; INTERNET; NETWORKS; RETAILERS; RETAILING AND DISTRIBUTION; COMPUTERS; COMMUNICATIONS TECHNOLOGIES; CORPORATE; DATA COMMUNICATIONS
Event Names: DISTRIBUTION CHANNELS; MANUFACTURING AND PRODUCTION; RETAILING

9/8/12 (Item 7 from file: 610)
Business Wire

00246632 20000403094B6764 **(USE FORMAT 7 FOR FULLTEXT)**
Eight New Pacific Century CyberWorks Investments Increase Portfolio to 42

Monday , April 3, 2000 08:14 EDT
Word Count: 3,286
Company Names: portal software, inc.; oracle corp.; eastman kodak co.; wink communications, inc.; silicon graphics, inc.; intel corp.; silicon valley plc; hewlett-packard co.; fujitsu ltd.; symbol technologies, inc.; franklin covey co.; qualcomm incorporated; international business machines corp.; palm inc.; realnetworks, inc.; microsoft corp.; cmgi, inc.; pacific century cyberworks; EASTMAN KODAK CO INC; HEWLETT PACKARD CO; HEWLETT PACKARD CO INC; SILICON GRAPHICS INC; TRANS WORLD GROUP PLC; TRANSMET HOLDINGS LTD; YAHOO INC; STAR TV; HANDSPRING; SYMBOL TECHNOLOGIES INC; PALM COMPUTING INC ; US ROBOTICS CORP; SOFTNET INTERNATIONAL INC; PACIFIC CENTURY GROUP INC; PACIFIC CENTURY INTERNATIONAL GROUP LTD; NETSCAPE COMMUNICATIONS INC;

NETSCAPE COMMUNICATIONS CORP; CHEUNG KONG HOLDINGS LTD; CHINA NATIONAL PUBLICATIONS IMPORT AND; EXPORT CORP; BEA INTERNATIONAL INC; BUSINESS EFFICIENCY AIDS INC; COMPAQ COMPUTER CORP; DELL COMPUTER CORP; TOSHIBA CORP ; PHOENIX PARTNERS; SYBASE INC; FLEISHMAN HILLARD INC
Geographic Names: ASIA; CALIFORNIA; CHINA; FAR EAST; INDIA; USA; AMERICAS; NORTH AMERICA; CENTRAL ASIA; INDIAN SUBCONTINENT; SOUTHERN ASIA
Product Names: COMPUTER SOFTWARE; CORPORATE NETWORKS; DATABASES; INFORMATION MANAGEMENT; INTERNATIONAL ECONOMIC RELATIONS; INTERNET; INVESTMENT; NETWORKS; COMPUTERS ; COMMUNICATIONS TECHNOLOGIES; CORPORATE; INTERNATIONAL ISSUES; FINANCIAL SERVICES; DATA COMMUNICATIONS

Event Names: FOREIGN TRADE AND PAYMENTS; INTERNATIONAL ISSUES; INVESTMENT; TECHNOLOGY DEVELOPMENT

9/8/13 (Item 8 from file: 610)
Business Wire

00174051 20000118018B1579 **(USE FORMAT 7 FOR FULLTEXT)**
Robertson Stephens Reiterates Buy Rating on IBAS

Tuesday , January 18, 2000 12:14 EST
Word Count: 848
Company Names: fleetboston financial corp; ROBERTSON STEPHENS CO; ROBERTSON STEPHENS AND CO LP; SECURITIES INC; SECURITIES; FLEET BANK; TICKERS INC
Geographic Names: USA; AMERICAS; NORTH AMERICA
Product Names: BANKING; BANKING AUTOMATION; MERGERS AND ACQUISITIONS; FINANCIAL SERVICES; CORPORATE
Event Names: MERGERS AND ACQUISITIONS

9/8/14 (Item 9 from file: 610)
Business Wire

00165477 20000104004B1290 **(USE FORMAT 7 FOR FULLTEXT)**
Robertson Stephens Reiterates Buy Rating on GSPT

Tuesday , January 4, 2000 10:55 EST
Word Count: 806
Company Names: media metrix inc; global sports inc; LTM; ROBERTSON STEPHENS CO; ROBERTSON STEPHENS AND CO LP; FLEET BANK; TICKERS INC
Geographic Names: USA; AMERICAS; NORTH AMERICA
Product Names: BANKING; BANKING AUTOMATION; INTERNET; RETAILING AND DISTRIBUTION; FINANCIAL SERVICES; COMMUNICATIONS TECHNOLOGIES; COMPUTERS

Event Names: INVESTMENT

9/8/15 (Item 1 from file: 810)
Business Wire

0951792 BW1443

TALLY SYSTEMS : Tally Systems Veranda 2.2 Cures Holiday E-Mail Attachment Blues; New Loading Options and Reports Help Track Down 'Attachment Abuse,' Service Level Bottlenecks, Capacity Problems

December 14, 1998

Byline: Business/Technology Editors
Word Count: 915

9/8/16 (Item 2 from file: 810)
Business Wire

0688962 BW1155

CODETEL : CODETEL, CAIS Internet to construct Latin America's first Internet network access point.

April 08, 1997

Byline: Business Editors
Word Count: 748

9/8/17 (Item 1 from file: 275)
Gale Group Computer DB(TM)

02610472 **Supplier Number:** 87080185 **(Use Format 7 Or 9 For** FULL TEXT)
Capacity and performance analysis of distributed enterprise systems: analytic and simulation models enhance the reengineering and tuning of large client/server distributed systems.

June , 2002
Word Count: 4280 **Line Count:** 00358
Descriptors: Mainframe computer; Client/server architecture; Systems management; Technology overview
Product/Industry Names: 3573112 (Mainframe Computers)
SIC Codes: 3571 Electronic computers
NAICS Codes: 334111 Electronic Computer Manufacturing
File Segment: AI File 88

9/8/18 (Item 2 from file: 275)
Gale Group Computer DB(TM)

02502194 **Supplier Number:** 74483443 **(Use Format 7 Or 9 For** FULL TEXT)
APPLICATION PERFORMANCE MEASUREMENT GROWS UP -- APM keeps tabs on performance from the perspective that matters most: your users'. Now, with the advent of common metrics and the APM MIB standard, this technology is about to come of age.(Industry Trend or Event)

May 14 , 2001
Word Count: 3569 **Line Count:** 00294
Geographic Codes/Names: 1USA United States
Descriptors: Management issue; MIS
Event Codes/Names: 220 Strategy & planning
Product/Industry Names: 3573021 (Management Information Systems (Computers))
SIC Codes: 3571 Electronic computers
NAICS Codes: 334111 Electronic Computer Manufacturing
File Segment: CD File 275

9/8/19 (Item 3 from file: 275)
Gale Group Computer DB(TM)

02488194 **Supplier Number:** 72297419 **(Use Format 7 Or 9 For** FULL TEXT)
A 3G billing maze.(Industry Trend or Event)

March , 2001
Word Count: 2785 **Line Count:** 00230
Company Names: Protek Ltd.--Services
Geographic Codes/Names: 1USA United States
Descriptors: Telecommunications services industry; Market trend/market analysis; GSM
Named Persons: Butcher, Geoff--Attitudes
Event Codes/Names: 360 Services information
Product/Industry Names: 4810000 (Telecommunication Services ex Broadcast)
SIC Codes: 4810 Telephone Communication
NAICS Codes: 5133 Telecommunications
File Segment: TI File 148

9/8/20 (Item 4 from file: 275)
Gale Group Computer DB(TM)

02086979 **Supplier Number:** 19576786 **(Use Format 7 Or 9 For** FULL TEXT)
How to mine data on the Web. (includes related article on data collection techniques) (Drilling for Data) (Internet/Web/Online Service Information)(Cover Story)

July , 1997

Word Count: 2450 **Line Count:** 00223

Special Features: table; illustration
Descriptors: Data Warehousing/Data Mining; Internet/Web Technology Application; Electronic Commerce
File Segment: CD File 275

9/8/21 (Item 5 from file: 275)
Gale Group Computer DB(TM)

01825466 **Supplier Number:** 17137239 **(Use Format 7 Or 9 For** FULL TEXT)
Financials system for big business. (Agresso 4.0/2 Windows-based client/server accounting system distributed by Fraser Williams) (Software Review)(Evaluation)

May 31 , 1995
Word Count: 2985 **Line Count:** 00242

Special Features: illustration; table
Company Names: Fraser Williams--Distribution
Descriptors: Integrated Accounting Software; Software Single Product Review
SIC Codes: 7372 Prepackaged software
Trade Names: Agresso 4.0/2 (Integrated accounting software)--Evaluation
File Segment: CD File 275

9/8/22 (Item 1 from file: 621)
Gale Group New Prod.Annou.(R)

03159237 **Supplier Number:** 84388067 **(USE FORMAT 7 FOR FULLTEXT)**
Infonet's Network Analysis Program Identifies Exponential Transactions Generated Via ERP, SCM and CRM Enterprise Class Applications.

April 4 , 2002
Word Count: 961
Publisher Name: Business Wire
Company Names: *Infonet Services Corp.
Geographic Names: *1USA (United States)
Product Names: *4811000 (Telephone Service)
Industry Names: BUS (Business, General); BUSN (Any type of business)
SIC Codes: 4813 (Telephone communications, exc. radio)
NAICS Codes: 51331 (Wired Telecommunications Carriers)

9/8/23 (Item 2 from file: 621)
Gale Group New Prod.Annou.(R)

02945211 **Supplier Number:** 76765664 **(USE FORMAT 7 FOR FULLTEXT)**

iBasis Reports Record Results for Second Quarter 2001; Company Achieves Record Revenue, Expanding Gross Margin and Narrowing EBITDA Loss.

July 26 , 2001
Word Count: 2485
Publisher Name: Business Wire
Company Names: *iBasis Inc.
Product Names: *4811522 (Internet Access Providers)
Industry Names: BUS (Business, General); BUSN (Any type of business)
SIC Codes: 4822 (Telegraph & other communications)
NAICS Codes: 51331 (Wired Telecommunications Carriers)

9/8/24 (Item 1 from file: 16)
Gale Group PROMT(R)

09305106 **Supplier Number:** 80966279 **(USE FORMAT 7 FOR FULLTEXT)**

What PMs need to know: Just because you're paranoid doesn't mean they're not out to get your data. (Internet Security).(Purchasing and supply management, data security)
Dec 13 , 2001
Word Count: 5005
Publisher Name: Cahners Business Information
Event Names: *260 (General services)
Geographic Names: *1USA (United States)
Product Names: *9912610 (Information Systems)
Industry Names: BUSN (Any type of business); TRAN (Transportation, Distribution and Purchasing)

9/8/25 (Item 2 from file: 16)
Gale Group PROMT(R)

05709573 **Supplier Number:** 50168942 **(USE FORMAT 7 FOR FULLTEXT)**

MOM Implementation Issues
July 15 , 1998
Word Count: 1941
Publisher Name: CMP Publications, Inc.
Event Names: *330 (Product information)
Geographic Names: *1USA (United States)
Product Names: *7372660 (Computer Data Communications Software)
Industry Names: BUSN (Any type of business); CMPT (Computers and Office Automation)
NAICS Codes: 51121 (Software Publishers)

9/8/26 (Item 1 from file: 20)
Dialog Global Reporter

22083760 **(USE FORMAT 7 OR 9 FOR FULLTEXT)**
APRIL 4, 2002 - 08:40 EST

April 04, 2002
Word Count: 894
Company Names: Infonet Services Corp
Country Names/Codes: United States of America (US)
Regions: Americas; North America; Pacific Rim
Province/State: California

9/8/27 (Item 2 from file: 20)
Dialog Global Reporter

10378147 **(USE FORMAT 7 OR 9 FOR FULLTEXT)**
Eight New Pacific Century CyberWorks Investments Increase -2-

April 03, 2000
Word Count: 1428
Company Names: Pacific Century Cyberworks Ltd; Hicks Muse Tate & Furst Inc
Country Names/Codes: Argentina (AR) ; United Kingdom (GB)
Regions: Americas; Latin America; South America; Europe; European Union; Western Europe
Province/State: New York; Texas

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>>>W:  "FREE" is not a valid format name in file(s): 347-349
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?  t s9/k/20
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9/K/20 (Item 4 from file: 275)
Gale Group Computer DB(TM)

Abstract: ...evaluate the historical patterns of their interactions with established customers, and site cookie files, customer **traffic** reports, registration forms and **server** log files provide users with information on a site's popularity. All visits to a...

...critical to the success of the project. Although the Internet represents a stateless environment, every **transaction** is recorded and subject to **aggregation**, merging and enhancement, and mining.
Capturing that look
The key to predicting the future lies...

19970700

? t s9/k/17

9/K/17 (Item 1 from file: 275)
Gale Group Computer DB(TM)

...In building a workload model, the first step is to determine the system resources (CPU, **network traffic**, **server** calls, and so on) required to support it. Each server may in turn spawn requests...of individual system components or workload elements. In such cases, the modeler may have to **aggregate transactions** and consolidate

hardware components. These choices may affect the accuracy and level of confidence attached...

20020601

? t s9/k/11

9/K/11 (Item 6 from file: 610)
Business Wire

...additional advertising and cross-sell opportunities.

Outsourced services provided by Escalate and Vcommerce include manufacturer **aggregation**, **transaction** processing, warehouse and inventory logistics, drop shipping, and customer service. Working with these leading e...

...and global enterprises. Inktomi's portal services include the search, directory, and commerce engine applications; **network** products include the **Traffic Server** **network** cache platform, Content Delivery Suite and associated value-added service applications. Inktomi's customer and...

...and Pequot Capital Management. For more information, visit www.vcommerce.com.

Note to Editors: Inktomi, **Traffic Server**, Scaling the Internet and the
tri-colored cube logo are all trademarks or registered trademarks...

? t s9/k/4

9/K/4 (Item 4 from file: 15)
ABI/Inform(R)

Abstract:

Bandwidth is the commonly used term for the capacity of a communications line to carry **traffic**. The capacity of a **network** is a measure of its ability to transport data and other forms of traffic. Just ...

...transmitted has been falling, it can still represent a significant cost to an organization. Parallel **network** problems and the consolidation of **traffic** onto a single, high-speed backbone network are discussed.

Text:

...use of a higher-speed line.

Of course, another way to make better use of **network** transmission facilities is to combine **traffic** with different daily peaks. It is common to use network facilities during the daytime for...

...the U.S. All of this further emphasizes the need to combine bandwidth usage, to **aggregate** different applications like **transaction** processing, multimedia, voice, fax and video in order to make the best use of the...the use of enterprise network switches, have the potential for eliminating much of the parallel **network** problem and consolidating **traffic** onto a single, high-speed backbone network. These networks will be able to combine data...

? t s9/k/3

9/K/3 (Item 3 from file: 15)
ABI/Inform(R)

Text:

...of the network, and the network objects and their attributes.

(2) Define the underlying queuing **network** that describes the flow of **traffic** from one object to the next and the protocols in use across the network

(3...

...are processing devices such as servers, or the original source of, or final destination for **network traffic**. Figure 2 illustrates the. object-oriented classification scheme Salsburg recommends.

NetMedia. The NetMedia attributes include...higher priorities than other messages. In a large network, the router messages can flood the **network**, stopping application **traffic**. The number of these routing messages can be reduced by defining sub-networks.

NetNodes. For...

...load matrix
(5) Calculate service time delays for various transitions in the STDs, and

(6) **Aggregate** delays for the client/server **transaction**.

Assume

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? t s9/7/17

9/7/17 (Item 1 from file: 275)
Gale Group Computer DB(TM)

02610472 **Supplier Number:** 87080185 **(This Is The** FULL TEXT)
Capacity and performance analysis of distributed enterprise systems: analytic and simulation models enhance the reengineering and tuning of large client/server distributed systems.

Aries, James A.; Banerjee, Subhankar; Brittan, Marc S.; Dillon, Eric; Kowalik, Janusz S.; Lixvar, John P.
Communications of the ACM , 45 , 6 , 100(6)
June , 2002

Text:

The world of large-scale computing dominated by mainframes was relatively simple. All applications and related data were co-located, and many thorny issues of distributed computing such as remote data access, splitting databases, and network latency were either nonexistent or presented easier problems. Unfortunately, mainframes or even clusters of mainframes did not scale well. The client/server architecture (CSA) has been introduced to overcome this difficulty.

Has CSA delivered as expected? The answer is "Yes, but ..." Ideally, CSA solutions scale better than mainframe solutions, but this can be accomplished by expending additional efforts required for architecting and tuning CSA systems. An effective approach to this task is building and exercising system workload and performance models.

Here, we share our experience of reengineering and tuning large CSA systems at Boeing. We consider systems that have been designed for tens of thousands of users and run applications such as Baan, PeopleSoft, and CATIA

(a CAD system).

A system of this kind has to satisfy several requirements, including adequate computational performance dictated by the company business processes and scalability, that is, the ability to accept new users and applications without severe performance degradation or expensive system architectural redesigns.

By attempting to solve this problem for several large applications, we have gained valuable experience that has advanced our understanding of the methodologies and tools needed for accomplishing the goal. Our experience may not be universal, but many other large companies face problems similar to Boeing's and could benefit from the lessons we learned.

The key technical challenges we encountered include:

* The workload predictions may be uncertain or inaccurate. Unless the designed system has been at least partly in production, the data needed for modeling may be unavailable.

* In multiple vendor environments, the responsibility for the system integration and performance tends to be ill-defined. By default it becomes the customers responsibility.

* Very large systems (large number of software, hardware components, huge amounts of data, and numbers of users) are frequently outside the scope of a vendor's experience. They are tempted to advocate linear extrapolations from smaller and less complex systems. The correct determination of system capacity and performance requires accurate modeling that exhibits highly nonlinear behavior.

* In general, hardware solutions advance quickly and are ahead of software that runs on new architectures. An example of this gap is parallel computing, which can offer significant speedups and scaleups on multiprocessor architectures. Often this advantage cannot be realized if software is singlethreaded.

One of the greatest difficulties of any analysis is understanding the customer problem and turning it into a formal problem statement. The problem must be translated from customer terminology into a formal statement amenable to mathematical analysis and programming. The capacity and performance analysis problem can be divided into two broad categories: Design of a new system from requirements, and reengineering and tuning a system already in production.

From a user's perspective, the most common measure of performance is usually stated in a service-level agreement that describes the level of performance required by the user community. Common user-based metrics include response time, percent uptime, and other metrics.

From the system manager's perspective, there are a large number of performance metrics of overall system health, such as CPU, network, disk utilization, cache hits and misses, and context switches. These metrics serve to measure both current system performance and the maximum system workload that can be supported while still meeting service requirements. The systems manager is interested in both the day-to-day performance of the system, as well as the ability of the system to support growth in the user workload. The manager must also know whether the system can support periodic spikes in workload that can usually be managed by workload scheduling if system capacity is known.

From the mathematical modeler's perspective, the service-level agreements act as hard constraints, with CPU utilization, network

utilization, and other metrics serving as measures of performance. The modeler will typically vary a number of system parameters such as network bandwidth, CPU speed, and workload in an effort to improve system performance and assess overall system capacity. For systems currently in use, a typical starting point is to use some of the metrics from production data mining and build a model that mimics production behavior. This gives us a calibration point for future extrapolation. Once we are confident we can reproduce the performance seen in production, we may use the model in its predictive mode by scaling the workload to find bottlenecks, response

times, capacities, and other parameters of interest for the system. The overall mathematical model can be broken down into a workload model, a performance model, and a cost model.

In building a workload model, the first step is to determine the system resources (CPU, **network traffic, server** calls, and so on) required to support it. Each server may in turn spawn requests to other servers before the user's job/query is resolved. To model the system, we need to know the load per query on each machine/resource, including remote calls generated by one node to another node. For large systems, this is typically stated in terms of probability distributions where a user of a particular type generates a probabilistic number of queries per unit time.

The performance model takes into account the physical hardware, connectivity, architecture, software, and workload model. This model is used to analyze the current system performance and predict future performance under varying workload and architecture changes. An important part of modeling a large system is determining whether it will scale well as additional users, servers, and other hardware and software are added to the existing system. The performance model should be flexible enough to perform ad hoc studies, such as moving workload assignments, adding new servers, splitting databases, and changing connectivity.

The cost model may include total system and life cycle costs, including hardware, maintenance costs, and projected costs of future revisions to the system. Cost is frequently modeled as a constraint (find a system with the best performance characteristics subject to a budget constraint), or as part of an objective function (find the lowest cost system that can meet service level agreements).

Designing New Systems, Reengineering Old Ones

We have the greatest opportunity to build performance and scalability into a new system from the outset. Once we have more than 100,000 users online with millions of lines of legacy code and database information, we are limited in our ability to change architecture or software. The cost of retraining the user community and rewriting code can be prohibitive after the system is in place.

For systems not yet built, there is the additional complexity of estimating usage patterns and understanding server loads from programs not yet written. Frequently, we must resort to benchmark studies from vendors and historical studies from the literature to predict resource requirements. We can then make load estimates in the proposed user environment and make proposals for system hardware and architecture.

It is a relatively low-cost task to perform a large suite of computer

simulations of a proposed system compared with the cost of building a system and rebuilding it if it cannot handle the workload. Adding new servers, changing server computing power, or changing connectivity is a straightforward programming task and ensures the right hardware has been ordered.

We are more constrained when redesigning an existing system because there is an existing infrastructure and user base that cannot be shut down during the transition. Unlike a new system, the existing system can be analyzed for usage patterns and other information that characterizes system usage. For a new system we only have projections of production system usage. For an existing system, production data mining provides an excellent starting point for our analysis.

When confronted with the task of reengineering and tuning an existing system, we often have an additional constraint--the reengineered system must be backward compatible with the existing production system and be capable of seamless integration with minimal downtime. This, of course, implies we are usually constrained to operate within an architectural framework close to the existing system. Radically different topologies, workload assignments, and software are usually out of scope.

Workload Characterization, Performance Testing, and Input Parameter Estimation

Capacity planning and performance analysis of a distributed system requires a flexible and representative model of the workload. Such a model must represent the essential workload complexity while remaining simple enough to provide timely analysis results. In most studies it is necessary to collect and analyze performance data to develop a quantitative model of the workload components. Thus, the collection and analysis of performance data should be integrated into the performance study plan. The data must be sufficient to estimate the model parameters and the model must reflect the essential behavior of the system for this process to work. Data collection is a time-consuming activity, and opportunities to collect usable data while the system is under development can be infrequent. It is common that the desired level of detail in a performance model be reduced because the available data will not support it. Thus, identification and collection of

the required data early in the lifetime of a study will contribute greatly to the end result. The development of a workload model primarily involves the following four steps:

Workload characterization involves specifying the nature of the tasks that will be performed on the system. This requires a good understanding of the business processes that will be used during the time period of the performance study. User roles can then be defined in terms of the business processes and decomposed into the computational transactions required to complete them. The workload is then defined by specifying the frequency and mixture of the different user roles. These user roles can be scripted to serve as a basis for automated load testing and can also serve as the basis for the workload model when the service demands associated with each user are quantified through measurement.

Workload model development. A quantifiable workload model requires that service demands associated with the workload components be estimated.

If the model is transaction-based, it is necessary to estimate the transaction arrival rates and the service demands associated with the various transaction types or classes. The service demands will typically include CPU, memory, interprocess communications, and I/O requests.

Observability of the service demands is often an issue due to the extreme complexity of large-scale distributed systems. The service demands will be distributed over the various types of servers and communication links comprising the elements of a multitiered system. The workload is distributed over many software and hardware components that communicate over diverse data links with differing mechanisms. Large distributed database systems will service transaction data requests with a small number of continuously running processes that will spawn many child processes in response to service requests and will defer some of their contribution to the service demand to cache refreshes and other housekeeping tasks. Thus, the direct isolation and measurement of transaction service demands from a production or load test environment is not always possible. It may be necessary to divide the service demand into steady state or periodic components reflecting the overhead and into other components proportional to the number of users of a given type. In practical situations it is necessary to combine diverse results from many sources and observations to calibrate a model reflecting the direct and deferred service demands resulting from workload elements.

The number of transaction types can be unmanageably large. This is often addressed by creating a class model of the workload wherein transactions with similar service demands and arrival patterns are clustered together. A major objective of a performance study will be to estimate the distribution of transaction response times as the load increases. Properly classifying transactions into classes is a key step in supporting this process.

Performance testing and data collection. It is necessary to collect data to convert a workload defined in terms of business processes into a model that can be quantified as service demands on a computer system. If data is collected from a production environment, it is not possible to control the environment. The data collection and analysis will then have to be designed to estimate the service demands from a mix of work where their effects cannot be directly measured. This may require more indirect parameter estimation techniques or elevating the level of detail input to the performance model. If load testing is to be performed, this problem is somewhat simplified because the definition of the data collection and analysis should be an integral part of the test design. Detailed planning is necessary to define the test suites, develop scripts for automated load testing, define the monitoring tools to be used, define what data will be collected, and define how the results will be stored and managed. Tools for data collection include:

* Performance monitors installed on each server (and typically supplied by the hardware vendor) are generally specific to the server architecture and operating system. Examples include Hewlett-Packard MeasureWare, Sequent Performance Evaluation Package, and Microsoft Perfmon.

This software will supply utilization of system components broken out by process ID and a great many other details abut the status of the system.

* Data logs supported internally by software components of the

architecture such as the transaction monitor, the database system, and the application software itself. These logs typically contain information about the number and type of transactions by time interval.

* Code instrumentation specifically inserted into the application software to provide checkpoints. This can be done by the software vendor, the system integrator, or may be automatically supplied as part of the emerging Application Response Measurement (ARM) standard.

* Instrumentation supplied with automated load testing software (for example, LoadRunner, PreVue CS/X) will typically collect transaction response time data and may provide additional information about the distribution of response times over the system components.

Input parameter estimation. Once performance measurement data has been collected, the parameters of the workload model need to be estimated. This consists of fitting the model parameters to match the observed behavior of the system. Regression analysis can be a useful tool for fitting parameters based on multiple test results, while a very simple model with one service class may use simple queueing models to derive service times based on the observed utilization and response times. A more sophisticated model may break out components of the load due to background processes, work rate proportional processes, and deferred processes. Data then must be collected in a manner that allows the model parameters to be independently observed and estimated. A good understanding of the design and behavior of the system is necessary to construct such a model. The usefulness of the model as a predictive tool will depend on how well the parameters reflect the behavioral characteristics of the system as well as the accuracy of the parameter estimation.

Load Testing for Performance Analysis

Load testing (LT) is considered a good approach for both performance and scalability analysis as well as collecting data as input for performance models. There are several competing COTS tools (LoadRunner and Performance Studio, for example) available for LT. Our approach is to combine the two methodologies, namely, load testing with performance modeling to analyze system performance and predict capacity. In this approach, we would use an LT tool with a moderate number of simulated users. We then use the test data collected as input to the performance model to study various what-if scenarios as well as predict knee-of-the-curve or system performance under heavy load conditions.

The client/server systems we encounter at Boeing are very complex, and it is difficult to test the performance and scalability of these systems. Whereas single-user testing focuses primarily on functionality and the user interface of a single application, load testing focuses on the performance, scalability, and reliability of an entire client/server system under various load scenarios. Traditional manual testing methods offer only a partial solution to load testing. A client/server system can be manually tested by constructing an environment where many users work simultaneously on the system. Each user works at a single machine and submits input to the system. This kind of testing has been used extensively for functional testing of various Boeing enterprise systems. However, the manual testing method is not very reliable for performance analysis and suffers from numerous drawbacks. An LT tool addresses the drawbacks of manual testing

with useful solutions. It reduces the personnel requirements by replacing human users with virtual users. These virtual users emulate the behavior of real users operating real applications. Because numerous virtual users can run on a single computer, it reduces the hardware requirements. Because these tests are fully automated, they can be easily repeated.

A real user session can be captured automatically into a script using an LT tool. This script can then be manually modified and parameterized to suit the needs of a test scenario as well as to emulate many users who would be running a similar script. Later, a scenario can be built out of these scripts to represent a complex mix of transactions. Scheduling of script execution within a scenario can be achieved for various arrival rates with different user types and mix of transactions. The commercially available LT tools support various client/server applications, including Database, Web, Baan, Java, Tuxedo, PeopleSoft, and others. The script generation happens on the client end where the LT tool captures the protocols issued from the client software. A three-tier client/server system is illustrated in Figure 1.

(FIGURE 1 OMITTED)

The results of the LT data can be used to estimate useful parameters as input to the performance models. One benefit of using data from LT for performance models is these tests can be performed in a controlled environment and repeated with ease, producing reliable input parameters for performance models.

Modeling Objectives

Modeling often becomes the solution of choice in assessing performance and scalability when the system of interest is unavailable for benchmarking. However, building a performance model in the absence of such information is no easy task. Enterprise systems frequently consist of many components arrayed in highly complex configurations: heterogeneous, geographically distributed servers linked through many different network interconnects, COTS applications based on proprietary middleware, databases of enormous size, and so on. Understanding the interactions within such a system is the first, and perhaps most difficult, step in building an effective model (see Figure 2).

(FIGURE 2 OMITTED)

Defining clear and attainable objectives is the key to a successful modeling project: Why is a performance model being built? What specific issues do we hope to address? Typical questions might include the number of CPUs needed for a particular server under a specified workload, or the impact on transaction response time when batch processing is added to the workload.

Objectives may differ depending on the stage of the design process. When used during early design, an enterprise system model can help build performance into the system at a time when the costs of doing so are minimized. The performance model may also be used to study different implementation choices. For example, should data be replicated at different sites to ensure reasonable response time? Are local application servers a good idea? How much network bandwidth is needed to support the file server connection? During the reengineering or tuning phase of the system, the objectives may focus on identifying bottlenecks, or assessing the impact of implementing new versions of software, or perhaps even consolidating hardware in an overloaded system. Finally, in addition to all these

performance considerations, cost objectives must be factored into the model results before a final recommendation is made on system deployment.

Modeling is all about tradeoffs and compromises; not every detail is needed to capture the essentials of real system behavior. Furthermore, not all of the parameters identified in the workload definition may be available to the modeler. Modeling objectives will drive this tradeoff between model abstraction and model accuracy--there is no need to model the entire computing complex if we are only concerned about specific subsystem performance. Likewise, a performance model may be based on vendor specifications and industry standard benchmarks too coarse to support detailed investigations of individual system components or workload elements. In such cases, the modeler may have to

aggregate
transactions and consolidate hardware components. These choices may affect the accuracy and level of confidence attached to the model, but quite often these compromises are well justified.

Building a valid and effective performance model is a process of refinement where first-generation models are successively replaced by models of increasing fidelity. Only through this validation and calibration process can we develop tools with predictive capability. Once scaling rules have been determined and the model begins to produce effective results, the analyst's work is still not complete. The models need to be maintained to reflect subsequent hardware and software updates, and they must be designed to anticipate the inevitable series of what-if questions that generally accompany the performance modeling exercise.

Modeling Tools Are Not Perfect

The success of a modeling project is a function of the tools and approaches used. Ideally, a tool should combine all essential input parameters into a model that reflects the actual operation of the system. The tool should then be able to produce statistics with metrics of interest such as CPU utilization, or response time.

Two modeling approaches are typically available: analytical models based on mathematical theory, or computer-based simulation models (4).

Analytical models can provide a quick insight into system behavior by applying the simple principles of queueing theory (1). However, in order to remain mathematically tractable, these models only accommodate a small number of variables--a situation that usually forces the modeler to oversimplify the real system.

As a complement to analytical modeling, computer-based simulations can potentially model the behavior of every system component. Here again, a tradeoff is needed to balance simulation time with the need for precision. Because most of these tools are based on discrete event simulation (2), generating too many events in a highly detailed model can quickly bring any simulation platform to its knees, giving rise to a situation where the performance and scalability of the simulation tool itself must be considered.

Many simulation tools fall into two main classes: general-purpose simulation tools or languages, and domain-specific simulation tools. A general-purpose simulation tool is totally flexible and open. These tools

usually offer simulation extensions to programming languages such as C, C++ (5), or Java (3). Most of these tools perform sequential simulations, which frequently limit the size or number of model runs to be performed. To overcome this restriction, parallel discrete event simulation tools are now

the subject of much investigation. However, these techniques must confront all the well-known problems of parallel programming such as synchronization, load balancing, and scalability.

Domain-specific simulation tools offer many attractive advantages. Because these tools focus on specific applications, they can offer predefined modules with plug-and-play capability. Because these tools are easy to use, people with limited expertise in the art of simulation can build performance models. However, be forewarned that relying on these tools without understanding their built-in assumptions and limitations is one of the quickest ways to sink a performance-modeling project.

REFERENCES

(1.) Allen, A.O. Statistics and Queuing Theory With Computer Science Applications. Academic Press.

(2.) Ball, P. Introduction to Discrete Event Simulation; www.strath.ac.uk/Departments/DMEM/MSRG/simulate.html.

(3.) Howell. F. and McNab, R. SIMJAVA: A discrete event simulation package for Java with applications in computer systems modeling. In Proceedings of the First International Conference on Web-Based Modeling and Simulation. Society for Computer Simulation, San Diego, CA, Jan. 1998.

(4.) Law, A.M. and Kelton, W.D. Simulation Modeling & Analysis. McGraw-Hill, New York.

(5.) Little, M.C. and McCue, D.L. Construction and Use of a Simulation Package in C++. Computing Science Technical Report. University of Newcastle Upon Tyne 437, (July 1993).

JAMES A. ARIES, SUBHANKAR BANERJEE, MARC S. BRITTAN, ERIC DILLON, JANUSZ S. KOWALIK, JOHN P. LIXVAR are members of the Distributed Systems Performance and Scalability team within the Math and Computing Technologies division of Boeing Phantom Works, Seattle, WA.

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